

Space-Charge Forces of a DC beam in a Continuous Bend* Y.-J. CHEN, Lawrence Livermore National Laboratory, S. GREGORY, Bechtel Corporation. The Advanced Radiograph Machine (ARM) will provide four lines of sight for the radiographic hydrotest. Four high current electron beams will go around several large angle bends in order to arrive at the x-ray targets simultaneously. The x-ray brightness depends on the electron beam's final spot size and hence its emittance. An analytical model has been developed to study the emittance growth in the bends. The DC electron beam is modeled as a ring in a continuous bend. The beam pipe has the shape of a torus. We have found that the space-charge forces are approximately linear if the beam pipe's minor radius is much less than its major radius (gentle bend). Due to the chromatic aberration of a bend, an off-energy beam will not travel on the designed trajectory. With this model, we have also studied the space charge forces in the presence of a small beam transverse displacement. Detailed results will be presented.

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